

Claims

1. Robot system including at least one mobile robot (10), for
treating a surface, which comprises map storage means to
5 store a map of the surface to be treated and means to
navigate the, or each, mobile robot (10) to at least one point
on a surface, where the, or each, mobile robot (10) comprises
locating means (13,14) to identify its position with respect to
the surface to be treated, characterized in that the, or each,
10 mobile robot (10) comprises means to automatically deviate
the mobile robot away from its initial path in the event that an
obstacle is detected along its path and means to store and/or
communicate data concerning the surface treatment performed
and any obstacles detected by the locating means (13,14).
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2. Robot system according to claim 1, characterized in that the,
or each, mobile robot (10) comprises emitting means (15) for
treating at least one point on a surface.
- 20 3. Robot system according to claim 2, characterized in that said
emitting means (15) are arranged to dispense at least one of
the following: ink, paint, glue, a gas, a liquid, a powder or light
to mark, etch, decorate or chemically react with the surface to
be treated.
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4. Robot system according to claim 2 or 3, characterized in that
the emitting means (15) produce emissions (17) such as
symbols, lines, shapes, or written characters in one or more
colours.
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5. Robot system according to any preceding claims, charac-
terized in that the, or each, mobile robot (10) comprises an on-
board computer (12) including map storage means and means
to store and/or communicate data concerning the surface
35 treatment performed and any obstacles detected by the
locating means (13,14).

- 5 6. Robot system according to any preceding claims, characterized in that the, or each mobile robot (10) is programmed to return to an area in which an obstacle was detected after a pre-determined time to check whether the obstacle is still present and whether it is therefore still hindered from performing surface treatment in that area.
- 10 7. Robot system according to any preceding claims, characterized in that the locating means (13,14) comprise at least one of the following types of sensor; optical such as a laser, thermal imaging, electro-magnetic, sonar, GPS, pressure, motion, angle detection, contact or direction sensors.
- 15 8. Robot system according to any preceding claims, characterized in that it comprises means to differentiate between different objects or different parts of the same object by detecting differences in the reflectivity of the different materials constituting those objects.
- 20 9. Robot system according to any preceding claims, characterized in that the, or each, mobile robot (10) comprises wired or wireless communication means such as an electric or optic cable, an antenna or BluetoothTM hardware to communicate with a remote user, control system or computer network or another robot.
- 25 10. Robot system according to any preceding claims, characterized in that the communication means are arranged to report that an obstacle has been encountered by a mobile robot (10) if the obstacle has not been removed after a pre-determined time such as a few seconds.
- 30 11. Robot system according to any preceding claims, characterized in that the, or each, mobile robot (10) traverses the surface to be treated.
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12. Robot system according to any of claims 1-10, characterized in that the, or each, mobile robot (10) traverses a surface other than the surface to be treated.
- 5 13. Robot system according to any preceding claims, characterized in that the, or each, mobile robot (10) comprises deletion means, instead of, or in addition to the emitting means (15), which are arranged to remove emissions (17) produced by the emitting means (15) of the same or another
10 mobile robot (10) in the same or a previous run respectively.
14. Method for treating a surface using a robot system including at least one mobile robot (10), comprising inputting a map of a surface to be treated into a computer (12) located on-board or
15 remotely to the, or each, mobile robot (10), navigating the, or each, mobile robot to at least one point on a surface, characterized in that the, or each, mobile robot (10) draws up a map of the surface using information collected from on-board or remote locating means (13,14) and automatically deviates away from its initial path in the event that an obstacle
20 is detected along its path and that the, or each, mobile robot (10) stores and/or communicates data concerning the surface treatment performed and the obstacles detected by the locating means (13,14).
- 25 15. Method according to claim 14, characterized in that map data and, if available, path data is inputted in the form of a file such as a file from a CAD-system.
- 30 16. Method according to claim 14 or 15, characterized in that the, or each, mobile robot (10) is programmed to return to an area in which an obstacle was detected after a predetermined time to check whether the obstacle is still present and whether it is therefore still hindered from performing surface treatment
35 in that area.

17. Method according to any of claims 14-16, characterized in that the, or each, mobile robot (10) is instructed to return to areas in which an obstacle was identified after the obstacle has been removed.
- 5 18. Method according to any of claims 14-17, characterized in that one or more points or parts of a permanent structure having a complex geometry and located in the working area of the, or each mobile robot (10) is marked with reflective material, such as reflective tape, to strengthen the signals reflected from said points or parts to facilitate correspondence between data from the locating means and data from the robot system's map.
- 10 19. Computer program product, characterized in that it contains computer program code means for making a computer or processor carry out the method according to any of claims 13 to 17.
- 15 20. Computer program product according to claim 19, characterized in that it is stored by means of a computer-readable medium such as a data server, magnetic or magneto-optical storage means.
- 20 21. Computer program product according to claim 19 or 20, characterized in that it further comprises instructions for the emitting means (15) used to treat the surface.
- 25 22. Computer program product according to any of claims 18-21, characterized in that it contains a map of a surface and optionally a pre-programmed path to direct the, or each, mobile robot around that path.
- 30 23. Use of a robot system according to any of claims 1-13, a method according to any of claims 14-18 or a computer program product according to any of claims 19-22 for indicating or marking out a physical lay-out on any indoor or
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outdoor surface such as at an exhibition, a trade fair or construction site.

- 5 24. Use of a robot system according to any of claims 1-12, a method according to any of claims 13-17 or a computer program product according to any of claims 18-21 for marking out a physical lay-out at a site under hazardous or hygienic conditions.

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